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The effect of commercialization on rural households' food security in West Ethiopia: The case of West Wollega zone

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ABSTRACT

This research attempts to investigate the effect of commercialization on rural households' food security in west wollega in general, and Gimbi and Harukebeles in particular. The study was mainly based on the cross-sectional data collected from 138 sample respondents which were randomly selected from four rural kebeles such as BikiltuTokuma, Genet Abo,InangoDambali, and Kaki Adarethat were stratified based on their distribution. For the data analysis, both descriptive statistics and inferential analysis were used to meet the stated objectives. From descriptive results, crop output market participation is estimated to be about 50.403543 with a minimum distance of 0.00 and maximum of 0.935537 respectively. Hence, the discrete density of this data shows a left-censoring. Accordingly, a tobit regression model was used to identify and analyze factors that determine the crop output market participation of the selected households especially in relation to crop commercialization. As a result, variables such as value of purchased crop input used, total quantity of output k produced by household i, and the average home distance from all weathered road, the farm land size, access to market, access to development agent and other predictors are found to be the significant predictors of the households crop output market participation in the Woreda. Hence, much emphasis better to be given to work out the difficulties of the households' road accessibility, an access to contact to frequently an agricultural development agent in order to promote their market participation.

Keywords: 1.Food security, 2.Commercialization, 3.Household, 4.distance, 5.dependency, 6.family size, 7.land size, 8.altitude & DA, 9.credit, 10.COMP

1. Statement of the Problem

Food is recognized as a basic human right, and lack of or inadequate food consumption has serious implications for general body health and well-being, growth, development and cognitive ability among children, and labor productivity. Adequate quantity and quality of food are, therefore, important for ability to grow, learn, and earn a living. This implies that food insecurity is a threat to overall human well-being, as well as efforts geared toward poverty reduction and economic growth (Kirimi.et al 2013).

Commercialization enhances the links between the input and output sides of agricultural markets. Commercialization entails market orientation (agricultural production decision destined for market based on market signals) and market participation (produce offered for sale and use of purchased inputs)

(Gebremedhin and Jaleta. 2010). Empirical evidence indicates that commercialization of smallholder farms has the potential to enhance incomes and welfare outcomes, and take smallholder farmers out of poverty if constraining factors such as lack of capital, basic skills (farming and commercial), high transaction costs, lack of infrastructure, lack of information and lack of educations could be eliminated.

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There is also an argument in favor of smallholder commercialization as a means to improve household food security, health and nutrition status. This may arise because commercialization is assumed to lead to increased household income which allows the household to purchase a diversified mix of goods and services, including food, health care, and better housing, among others, or increase the current market basket. In addition, through the income-food-consumption linkage, commercialization is assumed to increase the food intake of household members, which could improve their nutritional and health status (Kennedy, 1994 as cited in Jaleta et a/2009). In Ethiopia road transport is the dominant mode and accounts for 90 to 95 percent of motorized inter-urban freight and passenger movements. However, because of its limited road network, provision of infrastructure has remained one of the formidable challenges for Ethiopia in its endeavor towards socio-economic development and poverty reduction (Roberts.,P. et al., 2006).

Gimbi and HaruWoreda are crop production potential area in west wollegazone, about 90% of the population engaged in various crop production activities and generate their income for household consumption to sustain their livelihood; however, there is road accessibility problem in almost all kebeles of the district. Because of the imperative nature of the sector in the study area as well as in the country, it is relevant to undertake critical investigation on the effect of household home distances from all weathered road on output market participation in the study area. In this study, we attempt to examine whether improved road accessibility facilities contribute output market participation the household in the study area.

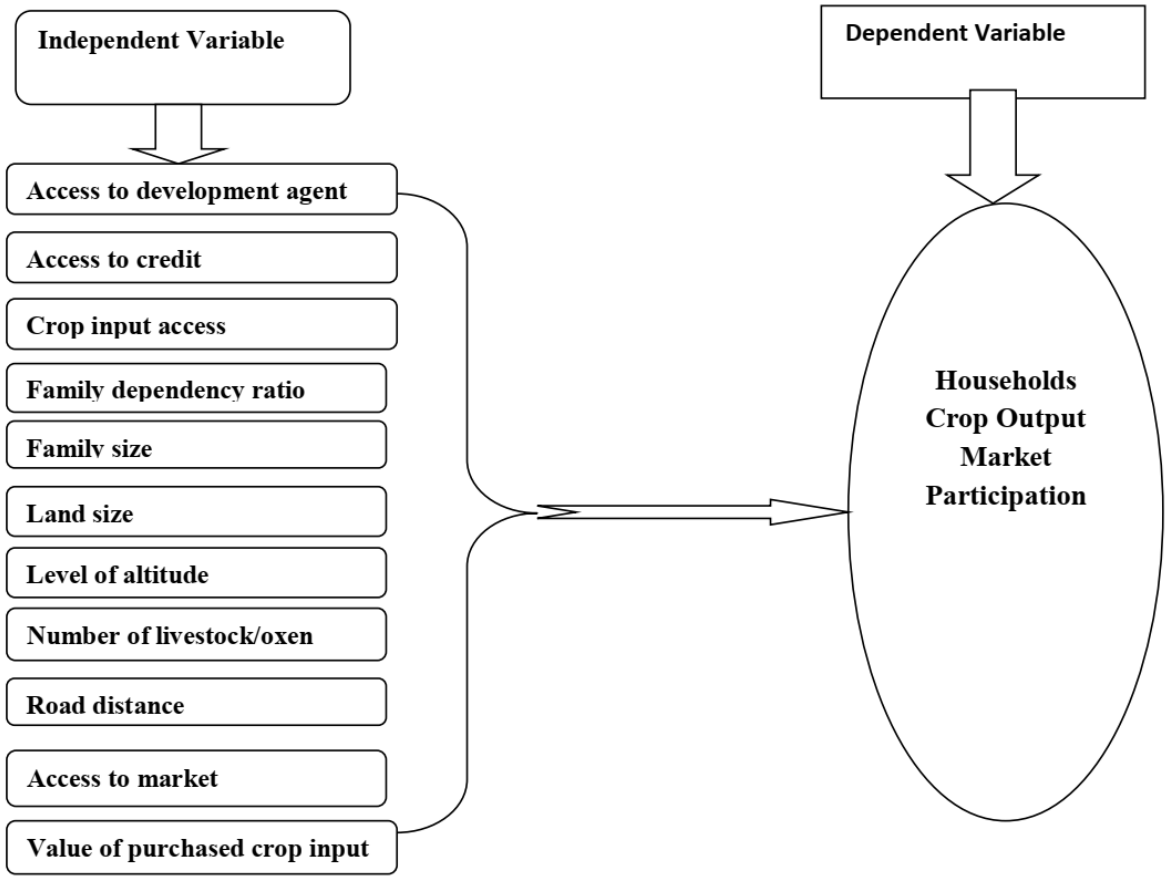
1.2.1. Research Questions

Hence, the study was sought to answer the following research questions:
To what extent availability of accessdo predict household output market participation.

To what extent demographydo predict household output market participation.

To what extentavailability of input do predict household output market participation2.4. Conceptual Framework

Figure 2.1: Conceptual Framework of the Study



Source: Developed by Researcher (2021)

RESEARCH METHODOLOGY

3.1. Description of the Study Area

The proposed study will be conducted in two sub-districts of West Wellega Zone in 2021 GC. West Wellega zone is located at about 441 km away from Addis Ababa, the capital city of the country to the west. it is one of among 23 Oromia Regional Zones that Found in the West of Oromia . Gimbi and HaruWoreda District was one of the 20 Woreda in West wellegaZone known for predominantly growing coffee. GimbiWoreda is Geographically located 9°10°-9°17° North latitude and 35°44°-36°09° East longitudes; covering a land area of 100,965 hectare (1009.65 km2) ,Borders with Lalo Asabi Woreda by West , East Rifty Valley zone -Diga Ayana by the East, Benishangul Region- Kemash Zone by the North ,HaruWoreda by the south.

HaruWoreda is Geographically located 8°49°-59.99° North latitude and 36°00°-0.00° East longitudes and 18 Km far from Zonal Town Gimbi , boardered in the south by noleKaba ,on the south west by Dale Lalo ,on the west by yubdo ,on the north by Gimbi and south west by Illubabor Zone.

Figure 3.1: Map of West Wollega Zone

Source: Shayashone Consultancy, (2015)

3.2. Target Population

The target population of the study were*2215*household in Gimbi and HaruWoredaof Westwollega zone in 2013 E.C.

Table 3.1: Total population of the study

Woreda	Name of Kebele	Total Households
Gimbi	BikiltuTokuma	801
	InangoDambali	475
Haru	Kaki Adare	556
	Genet Abo	383

Source*:* West wollegazone, Agricultural Extension Office report, 2014E.C.

The study area were selected from major coffee producing area since the product is important to the national economy, grown and marketed by smallholders for generations, high policy attention and intervention. This study area also selected to represent a dominantly subsistence farming community where land degradation coupled with erratic rainfall, drought problems pose a serious threat on households' food security in western Ethiopia. The area has suitable agro-ecological potential with the lowest drought risk rating (298) in the country (Milas, and AynaouiK, 1999). Cereals (maize, teff-eragrostistef, sorghum and barley), pulses (beans and peas), cash crops (coffee and khat-cathaedulis), and root crops (ensetventricosum-false banana and potato) are the major crops produced in the area. Different fruits and vegetables are also commonly grown where home gardening by smallholder families was observed to increase household income and food security (Kebebew et al. , 2011).

3.3. Sampling Size and Sampling Method

The sample groups was limited by using Watson's formula, and then comparing the divisions in four kebele in west wollega zone before using stratified random sampling to collect the data. One of the

sampling methods is simple random sampling which adopt in identifying respondents from each level to minimize bias.

According to(Watson, 2001) the correct sample size in a study is dependent on the nature of the population and the purpose of the study. This research was conducted with 5 percent marginal error and 95 percent confidence interval and 5 percent non response rate. Then the following formula was used for the calculation of the sample size since it is relevant to studies and sampling method(Watson, 2001) .

$$\frac{\left(\frac{P(1-P)}{\frac{A^2}{Z^2}+\frac{P(1-P)}{N}}\right)}{R}=\frac{\left(\frac{0.5(1-05)}{\frac{0.05^2}{1.96^2}+\frac{0.5(1-0.5)}{2215}}\right)}{0.95}=\frac{\left(\frac{0.25}{\frac{0.0025}{3.8416}+\frac{0.25}{2215}}\right)}{0.95}=\frac{\left(\frac{0.25}{0.0007815}\right)}{0.95}=\frac{(319.88)}{0.95}=160$$

Where:

n = sample size required

N = number of people in the population

P = estimated variance in population, as a decimal of 0.5 for 50-50

A = Precision, expressed as a decimal 0.5 for 5%,

Z = based on confidence level: 1.96 for 95% confidence,

R = Estimated Response rate, as a decimal 0.95% response will be return

Allocation of Sampled Respondents across Four Kebele Households

Table 3.2: Proportionate Distribution of Sample Size

Woreda	Name of Kebele	Households	Sample
Gimbi	BikiltuTokuma	801	40
	InangoDambali	475	40
Haru	Kaki Adare	556	40
	Genet Abo	383	40
Total			160

Source*:* West wollega Zone, Agricultural Extension Office report, 2013E.C.

3.4. Sources and Methods of Data Collection

Both primary and secondary data were collected for this study. To obtain primary data, structured questionnaire was used to collect data from sample household, focus group discussion, informal discussion and key informants interview was made in the study areas to get relevant and detail information about households' food security and its influencing factors in Gimbi and Haru*weredas* of west wellega zone, western Ethiopia.

Secondary data were collected from documents and publications of the CSA; IMF; Ethiopia Grain Trade Enterprise; FAO, ECX and other relevant offices. Moreover, available documents such as policies, strategies, guidelines and reports relevant to food security were reviewed.

3.5. Methods of Data Analysis

To address the objectives of the research and to analyze the data, both descriptive and econometric methods were employed. Accordingly, in the descriptive part, simple measures of central tendency, frequency and percentages were used; and in the econometric analyses, a tobit regression model was used to identify and analyze factors that determine the crop output market participation of the selected households especially in relation to the household's home distance from all weathered roads.

3.6. Model Specification

Crop Output Market Participation*:* Following Berhanu G and Moti J, 2010, we computed household crop output market participation in annual crops as the proportion of the value of crop sales to total value of crop production, computed as follows.

$$COMP_i = \frac{\sum_{k=1}^{K} \overline{P}_k S_{ik}}{\sum_{k=1}^{K} \overline{P}_k Q_{ik}}$$

Where $S_{ik}$is quantity of output ***k***sold by household ***i***evaluated at an average community level price **(P_k), Q_{ik}**is total quantity of output *k* produced by household ***i.***

The variables analyzed in this paper are crop output market participation of households in annual crop production in 2013.

An econometric model in general may be written as:

$$Y_i^* = \beta_0 + \beta' X_i + u_i \; ; \qquad i = 1, 2, 3, \ldots, N$$
$$Y_i = Y_i^* \quad if \quad Y_i^* > 0$$
$$Y_i = 0 \quad if \quad Y_i^* \leq 0$$

Here $u_i$is assumed to be NID $(0, \sigma^2)$ and independent of X_i.

Where y denotes dependent variable, x the vector of relevant explanatory variables including road distances determining y, β the parameters, and u the error term to account for unobserved random factors affecting y.

3.7. Operational Definition of Terms

In setting this study, the researcher is interested in analyzing the factors influencing crop output market participation. However, to capture the ceteris paribus effects, we need to control for other relevant explanatory variables. Hence, we also present our hypotheses about the effect of key variables that might influence crop output market participation.

Dependent Variable

Crop Output Market ParticipationIndex (COMPI); improved income has a potential of progressing the wellbeing of households in terms of food security, assuming other factors constant. Particularly, commercialization is supposed to bring a large impact on increasing farmer's income level which can be used as a source of fund for food purchase with better quality and quantity. However, other exogenous factors including price changes may reduce the consumption bundle of framers in a situation of price shock. Braun (1995) argued that commercialization has direct effect on household's income level which possibly leads to an increase in food and non-food expenditure. It is hypothesized that farmers who have larger crop output market participation index are more likely to be food secure than those with smaller crop output market participation index.

Independent/Explanatory Variables are;

Age of the Household Head: It is a continuous variable measured in a year. Age Matters in any occupation. Rural households mostly devote their time or base their livelihoods on agriculture. The older the household head, the more experience he has in Farming and weather forecasting. Moreover, older persons are more risk averters, and mostly they intensify and diversify their production activities. As a

result, the chance for such household to be food secure is high. Empirical evidence shows that age of the household head has positive effect on food security (Abebaw, 2003; Ayalew, 2003). In rural areas, age of household head quite often has negative relationship with food insecurity (Berhanu, 2003; Yusuf, 2007). In light of this, it is hypothesized that age of the household head and food security are positively related.

Education of household: Educational status of household head is a dummy Variable taking a value 1 if the household head is literate; 0 otherwise. Education equips Individuals with the necessary knowledge of how to make a living. The effect of education on food security works indirectly by influencing the actions of the person in how to make a living. Literate individuals are very ambitious to get information and use it. As agriculture is a dynamic occupation conservation practices and agricultural production technologies are always coming up with better knowledge. So if the household head is literate he is very curious to accept agricultural or livestock extension services, and soil and water conservation practices including any other income generating activities. Hence, in the study area if developmental activities are planned to be intervened and it is perceived that households who can read and write are the ones more likely to participate than illiterates and their chance to be food secure are higher. Abebaw (2003) showed that level of education has significant negative effect on food insecurity. As a result, it is hypothesized that education and food security are positively related in the sampled population.

Sex of household: It is a dummy variable taking a value of 1 if the household head is male, 0 otherwise. It is hypothesized that male-headed households will be more likely to be food secured. The possible explanation for the positive relationship indicates that male headed households more likely to be food secure than female headed households. This may be due to the fact that male headed households usually have higher incomes than the female headed households.

Family size: This variable refers to the size of household members converted to adult equivalent. Family size is hypothesized to have negative relationship with food security. It is obvious that as the family size increases, the amount of food for consumption in one's household increases. Empirical evidence shows that larger family size has negative effect on food security (Del Ninnoet al., 2001; Mulugeta, 2002; Abebaw, 2003; Yilma, 2005 and Yusuf, 2007, Mohamed 2014). Hence, it is expected that family size and food security are negative related. Hence, controlling for labor supply, larger households are expected to have lower market participation. Young household heads are expected to better market participation in crop output because they have potential to generate income and have information. **Dependency ratio** increases the subsistence requirements and is expected to influence the market participation negatively.

Household income: Annual income is a continuous variable and it is the Amount of total farm income measured (in Birr) a household has earned in the last twelve Months. It was expected that total farm income per AE is positively associated with food Security status. It is obvious that income earned from any source improves the food security Status of the household. Empirical evidence shows that income variable has significant Negative effect on food insecurity (Ayalneh, 2002; Abebaw, 2003; Yilma, 2005; Yusuf, 2007, Mohamed 2014). Hence it is expected that households who have large income, are better in their food Security status.

Household livestock holding: Households with larger farm holdings may be more likely to have higher crop output market participation hence; household endowments of labor, land, bullocks and farm equipment are expected to be positively associated with market participation. Ownership of equines is also expected to have the same effect through its role in reducing marketing (transportation) costs. We expect ownership of livestock other than ***oxen*** and equine, to be negatively associated with market participation, since they offer alternative cash income sources.

Access to Credit: It is a dummy variable in the model taking a value 1, if Household head have access to farm credit and 0, otherwise. Those households who received farm credit have possibility to invest in

farming activities, which is important component in small farm development programs. Empirical evidence shows that access to credit has positive effect on food security (Abebaw, 2003; Tesfaye, 2005,).

Land size of holding: This variable stands for the total land area cultivated in hectares. Losses of farm land to other uses because of population pressure and limits to the amount of suitable new land that can be brought in to production is one of the constraints of food production (Brown et al., 1990). As the cultivated land size increases, provided other associated production factors remain normal, the likelihood that the holder gets more output is high. It is hypothesized that farmers who have larger cultivated land are more likely to be food secure than those with smaller area.

Access to Markets and Road Distance

Access to markets and roads is expected to reduce marketing costs, thus encourage market participation. Road access is one of the important public goods. Improved road accessibility makes markets available for an output leading to stimulation of cash-crop farming, provides opportunities of off-farm income, integrates markets in different areas, and improves the market imperfections through reduction of transaction costs and imperfect information. Households with good access to road are, therefore, expected to have more income. It may also encourage more production because of extension services, inputs, and technology. Transportation cost decreases, farmers will use more intermediate inputs, which in turn contribute to agricultural output growth i.e. increase crop output market participation.

Access to Institutional Services

Agricultural services (extension, credit, market information) are expected to enhance farmer skills and knowledge, link farmers with modern technology, and ease liquidity and input supply constraints, thus are expected to induce crop output market participation.

Rainfall and Altitude

Rainfall may increase farm productivity, thus encouraging crop output market participation. Altitude determines the type of crops grown. High altitude areas are expected to have wider crop choice than low altitude areas, because of the more varied and more favorable climatic conditions.

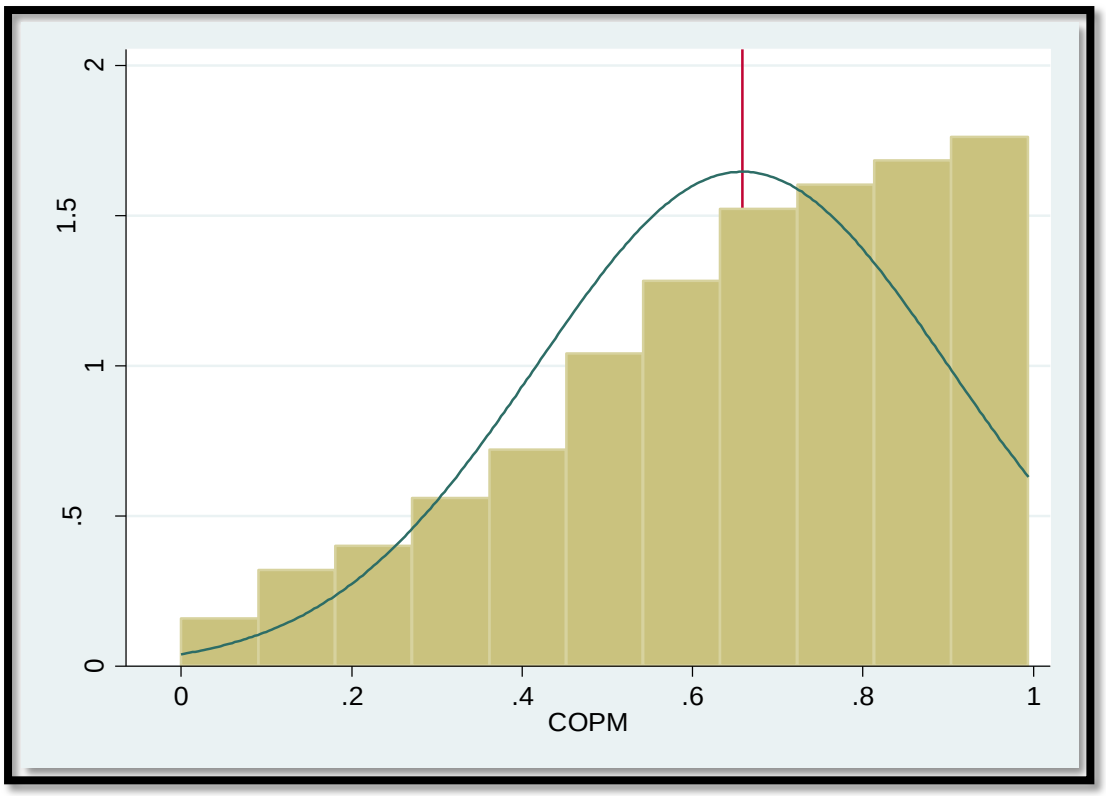
RESULT, DISCUSSION AND INTERPRETATIONS

4.3. ECONOMETRIC ANALYSIS

4.3.1. Introduction

The tobit model, also called a censored regression model, is designed to estimate linear relationships between variables when there is either left- or right-censoring in the dependent variable (also known as censoring from below and above, respectively). Censoring from above takes place when cases with a value at or above some threshold, all take on the value of that threshold, so that the true value might be equal to the threshold, but it might also be higher. In our case, the range of possible crop output market participation (COMP) is 0 to 0.935537. This means that our outcome variable is left-censored. In other words, if two households participants and 0.935537, they are equal according to our scale but might not truly be equal in accessibility on crop commercialization (in other words, we have a tiniest effect.). Tobit regression generates a model that predicts the outcome variable to be within the specified range.

Figure 4.1: Distribution of the Crop Output Market Participation

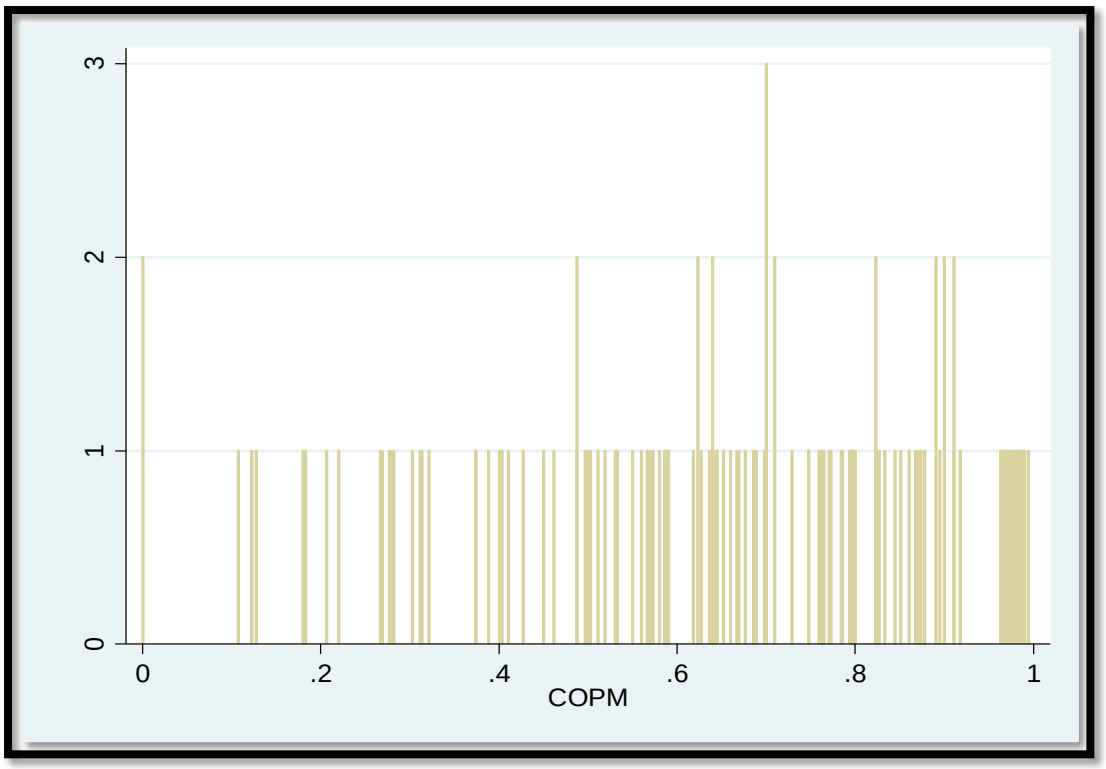


If we are interested in predicting a household's crop output market participation, we should first consider crop output market participation as an outcome variable. Pursuing the household's crop output market participation data with 138 observations, let's look at the distribution of the data by histogram below.

Looking at the above histogram showing the distribution of COMP, we can see the censoring in the data, that is, there are far more cases with crop output market participation of 0 to 0.935537than one would expect looking at the rest of the distribution. Therefore, the histogram above is just a graph that shows the distribution of the crop output market participation that a household head participates. The graph is sketched using eleven bars a formula to determine that was formulated as the lowest bar (called a bin) at 0, and each bin is 1 output as the researcher wants to accustom measuring all crop output market participation in half of a unit. This information is reasonably displayed in the command attached at appendix. Here, we also notice that the vertical axis measure frequency that is the number of household heads represented by each bar. Thus we can report that majority of the household head had a yield of crop output market participation between 0.6 and 0.8 units.

Below is an alternative histogram that further highlights the excess of cases where COMP = 0. In the histogram below, the **discrete** option produces a histogram where each unique value of COMP has its own bar. Using the **freq** option in Stata command, the y-axis was labeled with the frequency for each value rather than the density.

Figure 4.2: Household Crop Output Market Participation using Discrete



Because COMP is continuous, most values of COMP are unique in the dataset, although close to the center of the distribution there are a few values of COMP that have two or three cases. The spike on the middle of the histogram is the bar for cases where COMP = 0.7, the height of this bar relative to all the others clearly shows the excess number of cases with this value. Thus, we can consider that the longest bar at the middle shows the modal value of crop output market participation.

4.3.2. Bivariate Correlation

Correlations measure the strength and direction of the linear relationship between the two variables. The correlation coefficient can range from -1 to +1, with -1 indicating a perfect negative correlation, +1 indicating a perfect positive correlation, and 0 indicating no correlation at all. A variable correlated with itself will always have a correlation coefficient of 1. Next let we explore the bivariate relationships in our dataset.

Table 4.3: Bivariate Relationships Results (Correlation)

	vpciu	Qik	roadist	cimp	rainfall	famsize	landsize
vpciu	1.0000						
qik	0.3721	1.0000					
roadist	0.6845	-0.7612	1.0000				
cimp	0.4373	0.7289	-0.5373	1.0000			
rainfall	0.4271	0.3679	0.4706	0.6283	1.0000		
famsize	0.4158	0.4760	0.0287	0.6359	0.7061	1.0000	
landsize	0.1913	0.7019	0.3867	0.3719	0.5394	0.7194	1.0000
comp	0.3973	0.9738	-0.9059	0.8954	0.7952	-0.0259	0.8591

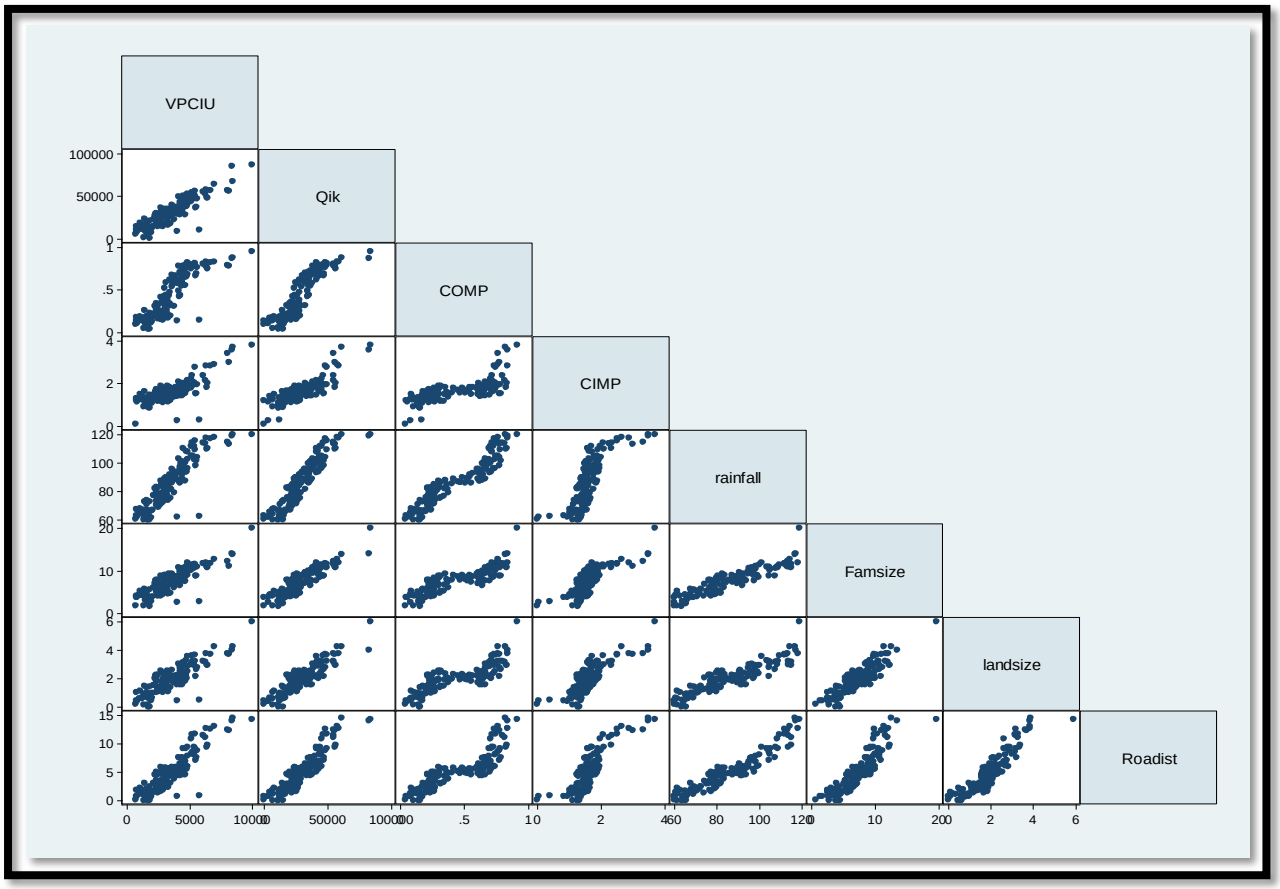
Source: Survey Data of 2021

The table shows that variables such as value of purchased crop input used (VPCIU), total quantity of output k produced by household i (QIK), the average crop input market participation (*CIMP*), rainfall, and

land size predictors has a positive relationship with a household's crop output market participation (*COMP*).

For instance, the bivariate relationship between value of purchased crop input used and the household's home distance from all weathered road is negative, indicating that as one home distance from all weathered road increases, the value of purchased crop input used decreases. This correlation coefficient is telling us the extent to which we can guess the value of one variable given a value of the other variable. The bivariate relationship between rainfall and COMP and CIMP is 0.7952and 0.6283 respectively. This depicts that there is a strong positive relationship between crop output market participation and rainfall as well as crop input market participation and the amount of rainfall. The other correlation coefficients of the predictor variables are positive indicating that as one score increases, the other also score increase.. Higher correlation coefficient signifies a strong relationship between the two variables either in positive or negative side. The correlation between any variable and itself is always 1.

Figure 4.3: Distribution of Bivariate Correlation Matrix



From this scatter plot, we can see that the points tend along a line going from the bottom left to the upper right, which is the same as saying that the correlation is positive. If the correlation was higher, the points would tend to be closer to the line; if it was smaller, they would tend to be further away from the line. Also note that, by definition, any variable correlated with itself has a correlation of 1. Thus, we could analyze these data using OLS regression. However, an OLS regression will treat the 0.935537as the actual values and not as the upper limit of the household's crop output market participation. With censored variables, all of the observations are in the dataset, but we don't know the "true" values of some of them. Therefore, when the variable is censored, this approach provides inconsistent estimates of the parameters; meaning that the coefficients from the analysis will not necessarily approach the "true" population parameters as the sample size increases. Thus, for censored data like the household's crop output market participation, the tobit regression model is the suitable one.

4.3.4 Checking the Reliability of Overall Model

At this point the researcher should closely examine the fitted model. Summaries from the full model with 12 predictors follow. The Log likelihood in the reduced model (Log likelihood = -25.03478) is the smallest one which indicated the best model and the chi-square test of goodness of fit (LR chi2 (12) = 678.47 with p-value= 0.0000) tests the hypothesis that the tobit regression model is considerably fine. This test is highly significant, indicating that one or more of the predictors are important in the model. Note that R^2 = 79.5926 for the full model. However, unlike the OLS regression, the R^2 for tobit model is not as much considerably reported.

The log likelihood of the fitted model is used in the likelihood ratio chi-Square test of whether all predictors' regression coefficients in the model are simultaneously zero. The number of observations tells us that there is no-missing value in the dataset for all of the response and predictor variables. As stated in the above section, the LR chi2(12) - is the likelihood ratio chi-square test that at least one of the predictors' regression coefficient is not equal to zero. The number in the parentheses indicates the degrees of freedom of the chi-square distribution used to test the LR chi-square statistic and is defined by the number of predictors in the model (12). Moreover, the Prob> chi2 - is the probability of getting a LR test statistic as extreme as (more than) the observed statistic under the null hypothesis; the null hypothesis is that all of the regression coefficients are simultaneously equal to zero. In other words, this is the probability of obtaining this chi-square statistic (678.47) or one more extreme if there is in fact no effect of the predictor variables. This p-value is compared to a specified alpha level, our willingness to accept a type I error, which is typically set at 0.05 or 0.01. The small p-value from the LR test, p <0.0000, would lead us to conclude that at least one of the regression coefficients in the model is not equal to zero. The parameter of the chi-square distribution used to test the null hypothesis is defined by the degrees of freedom in the prior line, chi2(12). As well as the Pseudo R^2 - is McFadden's pseudo R-squared. Tobit regression does not have an equivalent to the R-squared that is found in OLS regression; because this statistic does not mean what R-square means in OLS regression (the proportion of variance of the response variable explained by the predictors). Therefore, even if many researchers have tried to come up with it, interpreting this statistic needs a great caution.

4.3.4. The Tobit Regression Model Building Procedure

To generate a tobit model in Stata, we have to list the outcome variable followed by the predictors and then specify the lower limit and/or upper limit of the outcome variable. The lower limit is specified in parentheses after ll and the upper limit is specified in parentheses after ul. However, both the normal density and the discrete histogram show that the value is censored at left only. Therefore, the ul( ) option was not needed in this study. The i. before market, hhsex, accda, and acredit indicates that those variables are factor variable (i.e., categorical variable), and that they should be included in the model as a series of dummy variables. Therefore, among the six known model selection procedures (backward selection, forward selection, backward stepwise, forward stepwise, backward hierarchical selection, and forward hierarchical selection), the stepwise selection model selection procedure is automated (for which backward elimination is a special case) using the sw command in stata. To obtain the stepwise procedure for a tobit regressions model in our case, the researcher used a cutoff point of 0.05.

At the first stage, the full model containing about seventeen predictor variables is created. However, the procedure summary tells us that the least important variable in the full model, as judged by the p-value, is rainfall. This variable, upon omission, will reduce Log likelihood the least, or equivalently, increases the residual sum of squares the least. The p-value of 0.763 exceeds the specified 0.05 cut-off, so the first step of the backward elimination would be to eliminate rainfall from the model. This is the p-value for the t-test on rainfall in the 16-variable model (at appendix). The next variable eliminated is hheduc because of the p-value of 0.341 in the 15-variable model where rainfall was not fit. Next Stata further removes hhage

because of the large p-value of 0.653 in a 14-variable model with rainfall and hheduc removed. Other variables are eliminated similarly.

4.3.5. Results of Tobit Model and Discussion

Table 4.4: Estimated results of the Tobit model

Tobit regression				Number of obs =		138
				LR chi2(12) =		678.47
				Prob> chi2 =		0.0000
Log likelihood = -25.03478				Pseudo R2 =		79.5926
comp	Coef.	Std. Err.	T	P>|t|	[95% Conf. Interval]	
Vpciu	0.023017	0.002301	10.0030	0.007**	0.018507	0.027527
Landsize	0.105302	0.010528	10.0021	0.036*	0.084667	0.125937
Qik	0.205175	0.020513	10.0022	0.000 **	0.164970	0.245380
Roadist	-0.403854	0.040382	-10.0008	0.046 *	-0.483003	-0.324705
Cimp	0.495074	0.049497	10.0021	0.015*	0.398060	0.592088
Altitude	-0.074503	0.007451	-9.9991	0.431	-0.089107	-0.059899
Famsize	0.045727	0.005671	8.0633	0.007**	0.034612	0.056842
Depratio	0.082113	0.037512	2.1890	0.064	0.008589	0.155637
Numoxen	0.208567	0.020852	10.0023	0.141	0.167697	0.249437
Market_no	0.312714	0.031265	10.0020	0.043*	0.251435	0.373993
AccDA_no	0.072526	0.007251	10.0022	0.008**	0.058314	0.086738
Accredit_no	0.416582	0.041649	10.0022	0.100	0.334950	0.498214
_cons	-12.646195	0.264358	-47.8374	0.000	-13.16434	-12.12805
/sigma	0.43671452	0.043662			0.351137	0.522292
Obs. summary:		47 left-censored observations				
		91 uncensored observations				
		0 right-censored observations at COMP<=0				

Source: Survey Data of 2021

Based on theabove table 4.4, regression result, the following model has formulated to examine the impact of commercialization on rural households' food security in major coffee growing areas of west Ethiopia. The hypotheses of the study have tested by using Tobit Regression Model effect as seen in table 4.4. It can be noticed from table 4.4 the LR chi2 (12) statistics in the regression model effect is 678.47 with probability (Prob> chi2 = 0.000) which indicates a good fitness of the predictability of the regression model used in this study. This indicates that the overall model is highly significant at 0.000 and that all the independent variables are jointly significant in causing variation of crop *output market participation (COMP)* in study area.ThePseudo R square indicates the strength of interpretation in Tobit Regression Model as it is explained by 79.6% variation incrop output market participation (COMP) in study area but the remaining 20.4 % variation of crop output market participation (COMP) are caused by other factors that are not included in this study.

As observed from the above table 4.4, out of the study explanatory variable under study, the market size has more contribution than crop input market participation, road distance, access to market, quantity of output produced, land size, access to development agent, family size and value of purchased crop input, since it had relatively better amount of standardized coefficient than others.

Depending on their standardized coefficient, the interpretation of each explanatory variable has carried out as follows; one unit increase in *crop input market participation* will increase crop output market participation by 49.5%;a unit increase in *road distance away from household farm area* will increase crop output market participation by 40.3%. A unit increase in the access to market of household farm will

increase their crop output market participation by 31.3%;a unit increase in the level of *quantity of output produced* by household will increase their crop output market participation by 20.5% and a unit increase of household *land size* will increase their crop output market participation by 10.5%. In addition, a unit increase of household access to development agent will increase their crop output market participation by 7.3%;a unit increase in the level of household *family size* will increase their crop output market participation by 4.6% and a unit increase of value of purchased crop input will increase household crop output market participation by 2.3% respectively. As the magnitude of weighted beta, it can be concluded that if all independent variables are ignored, the study area itself have the value of *-12.6 influence* household crop output market participation. As per the regression analysis, the best fit for the data has defined by the following equation:

$$\boldsymbol{COMP = -12.6 + \sum 49.5cimp + \sum 40.3roadist + \sum 31.3Market_{no} + \sum 20.5qik + \sum 10.5landsize + \sum 7.3AccDA_{no} + \sum 4.6famsize + \sum 2.3vpciu - \varepsilon_0}$$

Where;

- AccDA_no access to development agent
- *cimp* Crop input market participation
- COMP crop output market participation
- Famsize family size
- Landsize land size
- Market_no access to market
- qik quantity of output produced
- roadist Road distance
- vpciu value of purchased crop input and are explanatory variables used in regression model that predicts crop output market participation
- And $\boldsymbol{\varepsilon}$ is the stochastic error of the study

According to (Gujarati, 2004), the research hypothesis is a predictive statement about the independent variable effect on the dependent variable. The alternative hypothesis (H_a) is usually the one, which one wishes to prove and the null hypothesis (H_0) is the one, which one wishes to disprove. The researcher is suggested to reject null hypothesis (H_0) when the null hypothesis (H_0) is actually true, and the researcher is suggested to accept null hypothesis (H_0) when the null hypothesis (H_0) is false, and the reverse is true for the alternative hypothesis (H_a) (Anderson et al., 2011). Hypothesis testing result in either accepting the hypothesis or in rejecting the hypothesis based on the conventional precision values less than 0.05 (Bougie., 2010). Depending on each independent variables extent of estimated coefficients of the modeland their level of significance at (P<0.000),the proposed hypotheses either accepting or rejecting decision and their interpretation was made (see table 4.4) as follows;

Firstly, Crop input market participation (*cimp*) with the estimated coefficients of 0.495 at p<0.015, which indicates Crop input market participation (cimp) impactful predicts crop output market participation (*COMP*) with the decision of accepting the alternative hypotheses and rejecting the null hypothesis in the study area. Secondly, road distance (roadist) with the estimated coefficients of 0.403at p<0.046, which indicates road distance (roadist) impactful predicts crop output market participation (COMP) with the decision ofaccepting the alternative hypotheses and rejecting thenull hypothesis. Thirdly, access to market (Market_no) with the estimated coefficients of 0.313 at p<0.043, which indicates access to market (Market_no) impactful predicts crop output market participation (COMP) with the decision of accepting the alternative hypotheses and rejecting the null hypothesis. Fourth, quantity of output produced (qik) with the estimated coefficients of 0.205 at p<0.000, which indicates quantity of output produced (qik) impactfulpredicts crop output market participation (COMP) with the decision of accepting the alternative hypotheses and rejecting the null hypothesis.Fifth, land size (landsize) with the estimated coefficients of 0.105 at p<0.036, which indicates land size (landsize) impactful predicts crop output market participation (*COMP*) with the decision of accepting the alternative hypotheses and rejecting the null hypothesis in the

study area. Sixth, access to development agent (AccDA_no) with the estimated coefficients of 0.073at p<0.008, which indicates access to development agent (AccDA_no) impactfulpredicts crop output market participation (COMP) with the decision ofaccepting the alternative hypotheses and rejecting thenull hypothesis. Seventh, family size (*famsize*) with the estimated coefficients of 0.046 at p<0.007, which indicates family size (*famsize*) impactfulpredicts crop output market participation (*COM*P) with the decision of accepting the alternative hypotheses and rejecting the null hypothesis. Finally, value of purchased crop input (*vpciu*) with the estimated coefficients of 0.023 at p<0.007, which indicates value of purchased crop input (*vpciu*) impactful predicts crop output market participation (*COMP*) with the decision of accepting the alternative hypotheses and rejecting the null hypothesis.

CONCLUSIONS & RECOMMENDATIONS

5.1. CONCLUSION

The major objective of this study was to estimate the household's crop output market participation in the study area of west wellegazone and to find out the determinants that affect their crop commercialization. To achieve objectives of the study, different questions followed by open-ended questions were used. The data used for this study are both from primary and secondary sources. The primary data were obtained from a contingent valuation survey of 138 sampled households in the study area. Secondary data were obtained from both published and unpublished materials such as office records and reports, journals, research papers, books and files from internet/web pages. The data collected from both sources were analyzed through descriptive and econometric methods. By using descriptive analysis we are tried to analyze households' socio economic and demographic conditions and crop output market participation. In the econometric analysis, 16 variables, 5 dummy, 9 continuous and 2 discrete variables were hypothesized earlier to data collection.

Results of the descriptive analysis showed that out of 138 sampled households, 98 (71%) are male respondents while the rest 40 (29%) are female respondents. About 77 (55.8%) respondents have attended their formal education while the rest 61(44.2%) are illiterate. Majority of the household's that are participated in the survey are found to be young and belong to the economically active group. The mean age of household head is 40 years with a minimum age of 20 years and maximum of 71 years of age. About 72 (52.17%) of the respondents replied that they have an access to market to offer their crops to the nearest market and the rest 66 (47.83%) of the respondents reported that they have no access to market. Even if majority of the respondents reported they have an access to contact agricultural development agents for an advice, 59 (42.75%) of the households have no access to make contact with the DA's. More than half of the participated household head's stated that they have an access to get credit from various credits and saving Share Company.

The average distance of the home of the household's from all weathered road is 5 kilometer with minimum of 0.25 km and maximum of 14 km. However, the normal crop output market participation (*COMP*) and crop input market participation (*CIMP*) is 0.403543 and 0.984669 respectively. The middling altitude of the land of the surveyed area is about 2150 meter ranging from minimum altitude of 1500 meter to maximum altitude of 3200 meter and the monthly rainfall is 86 millimeter. The survey showed that the average family size of the households is 7.435 with minimum of 2 and maximum of 20 members within a single household and the average number of oxen that a household head own is 2.63. However, at average, only about 1.888 hectare of land is farmed within a range of 0 to 6 hectares. This might be because of an increment in the total number dependency persons. I.e. The overall mean dependency ratio of sample households was 0.870579 with standard deviation of 0.531606.

The average value of purchased crop input used of the households is 3619.058 ranging from 0 to 10158. While the average a total quantity of output k produced by household i evaluated at any average

community level price of the respondents is 30504.46 which ranges from 6150 to 85500. As stated in the methodology and results section, we faced with the problem of left-censoring data. Hence, the tobit model is used to estimate the effects of different factors that influence household's crop output market participation that is expected to determine crop commercialization of the households using STATA version 12. The results of the tobit model suggests that households' home distance from all weathered road and value of purchased crop input used (VPCIU) are the most influential variables of the study.

Variables such as value of purchased crop input used, the total quantity of output k produced by household ***i***, and households' crop input market participation are positively (as one variable increase, the other also increases) and significantly related to households' crop output market participation at 5% level of significance. Conversely, the rainfall and household's family size have a positive and significant association with crop input market participation. In other words, as a monthly rainfall of the area increases by one millimeter, the household's crop input market participation will also increase. Correspondingly, as family size increases by one person, the household's crop output market participation increases by 0.045727 holding other predictor variables constant.The extent of crop output market participation of the household's is also influenced by the dummy variables access to market and an access to make contact with agricultural development agent (DA). A household that have an access to get a nearby market are positively associated with the existing household crop output market participation. According to the findings of this study, the households that can get an advice from development agents are the farmers that are crop output market participants.

ABBERVATIONS/ACRONYMS

ACCORD	Agency for Cooperation and Research in Development
AE	Adult Equivalent
Comp	Crop Output Market Participation
CSA	central statics authority
ECX	Ethiopia commodity exchange
EEA	Ethiopia Economics Association
EHNRI	Ethiopian Health and Nutrition Research Institute
FAO	Food and Agricultural Organization
FDRE	Federal Democratic Republic of Ethiopia
HFSS	Household food security status
HH	Household
IFPRI	International Food Policy Research Institute
IMF	International Monetary Fund
Kcal	Kilo calorie
MDG	Millennium development goal
MEDAC	Ministry of Economic Development and Cooperation
MLE	Maximum livelihood estimation
MOFED	Ministry of Finance and Economic Development
PA	Peasant Association
SD	Standard Deviation
TLU	Total Livestock owed
TYYP	Ten years perspective plan
UN	United Nations
USAID	United states agency for international development

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